



Occurrence characteristics and control measures of plant pests and diseases

Yunmei Lu

Hubei Engineering Research Center for Specialty Flowers Biological Breeding, Jingchu University of Technology, Jingmen, Hubei, China

* Corresponding Author: **Yunmei Lu**

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Abstract

This paper analyzed the occurrence characteristics of plant pests and diseases, explored the occurrence characteristics and conditions of dominant diseases and pests such as powdery mildew, gray mold, aphids and whitefly, and formulated comprehensive prevention and control measures for the dominant diseases and pests of plant, mainly including cultivation management, ecological regulation and color board killing, supplemented by chemical prevention and control, aiming to provide strong technical support for the healthy development of plant flowers in Hubei province.

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1. Introduction

Good facilities provide a superior environment for flower production, and provide a good breeding and harm environment for the occurrence of diseases and pests^[1]. Facilities have broken the unfavorable conditions of pests and diseases over winter and summer, so that pests and diseases have achieved annual reproduction and infestation, which has caused a greater threat to the plant flower production, not only destroying the ornamental value of flowers, but also causing greater economic losses to the producers, which is not conducive to the intensive and large-scale production of flowers^[2]. This study analyzed the occurrence characteristics of plant pests and diseases, explored the dominant diseases and pests and their occurrence conditions, and formulated comprehensive prevention and control countermeasures of facility dominant diseases and pests, aiming at providing strong technical support for the healthy development of facility flowers in Hubei Province.

2. There are many kinds of facility pests, and new pests are emerging constantly

There are perennial roots, bulbs, herbs, woody flowers and other varieties in facility cultivated flowers. Because there are many varieties and different growth habits, the problem of insect infestation is much more complicated than that of open forest trees. With the development of the flower industry, the increase of international flower fairs and other activities, and the frequent exchanges of inter-regional flower species introduction and transport activities have resulted in a significant increase in the risk of new insect species, such as the American maculus fly, South American maculus fly, tea yellow mite, whitefly tabaci, stem nematode, etc., and the intermingling of remote and local insect sources have formed a complex and huge pest group, which is not only large in size, but also large in size. Different ways of harm, a single prevention and control system cannot meet the needs of production, we must consider the comprehensive, scientific design, the implementation of comprehensive prevention and control strategy.

3. The diseases of warm and high humidity are more frequent

Facility diseases, such as downy mildew of rose, powdery mildew of chrysanthemum and Cyclamen grey, mostly occur in the environment with high humidity and warm temperature, large temperature difference between day and night, and alternating between dry and wet Mildew, etc.

The optimum temperature for conidial germination was 25 ~ 28 °C, the optimum relative humidity was 50% ~ 80%, and the strong light was not conducive to the reproduction of the pathogen. Under the conditions of open field production, especially in the years of high temperature and less rain in summer in the cultivation area, the disease can die out naturally, but it breaks out in the facility environment. The temperature and humidity of facilities are relatively stable, and in areas with extensive management, flood irrigation or spray irrigation can increase the occurrence of powdery mildew. For example, when chrysanthemum powdery mildew was investigated in October, the disease index was still high.

4. Frequent occurrence of physiological diseases

There are many kinds of flowers in the facilities, and their growth habits are different, so it is difficult to realize the cultivation and management because of the seed adjustment, resulting in the management is not fine enough, resulting in frequent accidents of lack of nutrients, sunburn, high temperature heat damage and gas damage. For example, when the light is too strong in summer and autumn, the leaves of flowers such as dandelabra, phalaenopsis, and rose will turn yellow and become scorched, and the ventilation time is not timely or insufficient, which will cause the flowers and plants near the entrance and exit of the facilities to appear "flash seedling" due to excessive temperature change; The height of the facility shed is too large, leading to temperature difficulties, if the use of charcoal stove heating, or excessive application of ammonium bicarbonate, etc., easy to produce CO or H₂S and other toxic gases, resulting in a large area of flowers poisoning problems.

5. Bacterial soft rot disease and its occurrence conditions

Bacterial soft rot occurs mostly on young and juicy tissue bulbs, bulbs and roots [3]. The tissues of the affected parts disintegrate and discharge bacterial pus, emitting a foul smell. The environment of high temperature and high humidity will lead to pandemic, and the high-incidence varieties are the flower varieties such as Clivier, Cyclamen and iris.

6. Leaf spot disease and its occurrence conditions

Leaf spot disease mainly includes brown spot disease, black spot disease and gray spot disease, which is mainly caused by local infection of leaves. The shape and color of the spot are different, and small black spots will grow on the spot when the environment is suitable. The ventilation in the facility is poor, and the disease spot is easy to fall off when the temperature is high, resulting in perforation symptoms. It occurs under extensive management conditions such as low temperature and fog outside the facility, poor light transmission of shed film, poor ventilation and clotting. Common susceptible species mainly include orchids, rose, camellia and gardenia.

7. Gray mold disease and its occurrence conditions

Gray mold is one of the most harmful diseases in plant flowers, which has a fast-epidemic speed and is difficult to control. Under high humidity and warm environment conditions, especially before and after flowering, weak tissues are most likely to appear, such as premature aging petals, aging leaves and other tissues are easy to induce gray mold. In the early stage of leaf infection, the leaf tip and leaf

margin showed chlorosis spots, and the middle and later stages of growth were gradually covered with gray mold, which affected a wide range of hosts. The infected flower varieties were mostly begonia, rose and cycleen.

8. Powdery mildew disease and its occurrence conditions

The fungus was mainly harmful to leaves, shoots, flower organs and branches. At the early stage of infection, a white powder layer will appear in the infected part, and local tissues will turn yellow until gradually dying. The spring and autumn seasons are hot and rainy, and the facilities are easy to form an alternating dry and wet environment, which is conducive to bacterial infection and epidemic. In the middle and late stages of flower plant growth, nitrogen fertilizer was applied, and the planting density was too high, which led to insufficient light and poor ventilation in the middle and lower parts of the plant, and increased the risk of white powder disease. The incidence of white powder disease was more serious in susceptible hosts such as rose and sunflower.

9. Scale insect infestation and its occurrence conditions

There are many species of scale beetles. Female adults usually suck SAP at the main veins of the shoots and back of the leaves, while male adults mainly suck SAP at the front of the leaves. As a result, the branches become dry, the trees become weak, the leaves become yellow, and coal pollution is induced, which can realize annual damage.

10. Whitefly infestation and its occurrence conditions

Whitefly mainly gathered on the back side of young leaves and caused damage by stinging and sucking. The front side of the affected leaves showed white spots of chlorosis, and in severe cases the leaves turned yellow, resulting in leaf curl. It is easy to induce coal pollution, affect leaf photosynthesis, lead to leaf drying, and can spread virus disease [4]. The annual reproduction of white worms in the facility was harmful, the development cycle was shorter, and the incidence was increased, especially in jasmine, rose, Rhododendron and other hosts.

11. Red spider infestation and its occurrence conditions

Red spider mainly harms the leaves, often gathered in the back of the leaf thorns suction juice, the front of the leaves initially showed a white point, when the insect density is large, the leaves will appear into a piece of yellow points, when the damage is serious, the leaves will be scorched like fire, and even a wire mesh. When the temperature is high and dry, red spider has the phenomenon of overlapping generations, which is difficult to control, and mainly harms rhododendrons, rose and camellia.

12. Cultivation management

Strictly select seeds before sowing, do a good job of medicine or warm soup soaking seeds, seedlings should do a good job of dipping root treatment. Before colonization, we should apply fully decomposed organic fertilizer or bacterial fertilizer, and do a good job of high temperature confinement treatment or soil treatment agents such as Weibaimu, cotton ion or calcium cyanamide. In environments with drip irrigation facilities, chloro bromo isocyanuric acid can be dripped once to disinfect the soil 1 week before colonization. Strengthening seedling bed management, controlling density, strengthening ventilation, inhibiting seedling growth and cultivating strong seedlings can effectively reduce the risk of

soil-borne diseases and improve resilience. Planting different kinds of flowers in rotation, do not choose the same family or closely related crops, can effectively reduce the occurrence of soil-borne diseases, and break the barrier of continuous cropping. The deep trenches and high beds can be watered by drip irrigation, and the aisles can be laid with crushed corn stalks to reduce the humidity in the facilities and improve the ventilation and light transmission performance, which can effectively reduce the incidence of diseases. According to the variety, according to the growth habit and growth period characteristics, adjust the good growth trend, scientific water and fertilizer management, improve the resistance of plants to diseases and insects, dry and high temperature can spray potassium dihydrogen phosphate mixed with brassicacin lactone, improve the resistance of plants.

13. Ecological regulation

The facilities are covered with anti-fog agricultural film, the light transmission rate can be increased by 15-20%, which can effectively reduce the humidity in the shed, and the thermal insulation performance can be increased by 2-3 °C, which can effectively reduce the incidence of diseases and insects. For Dettol film, you can choose to spray agricultural silicone additives on the inside of the shed film in the afternoon to improve the fog elimination ability of the shed film. As far as possible, the watering method of the facility should be drip irrigation, and the operation line should be covered with grass and wood ash, turf soil, rice husk or crushed corn straw, which can effectively reduce the humidity in the facility. Scientific control of the environment, reasonable ventilation to improve temperature and humidity, reduce leaf condensation.

To prevent the risk of diseases such as downy mildew and gray mold, the temperature can be controlled at 20-25 °C and the humidity can be controlled at 60%-70%. Based on the adaptability of dominant pests and diseases to temperature and humidity, variable temperature management can be adopted to develop conditions conducive to flower production and not conducive to the occurrence of pests and diseases. Temperature control above 28 °C for high temperature confinement can effectively inhibit the spore reproduction of gray mold, downy mildew and other diseases. Meanwhile, suitable high temperature environment can activate the defense enzyme system in the host body and improve the plant immunity. When the room temperature reached 36-40 °C in the morning on a sunny day, the high temperature confinement shed was carried out for 2h, which had a significant inhibitory effect on gray mold, downy mildew and other diseases.

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Conclusion

Effective cultivation and management of flowers in facilities require meticulous attention to diverse growth habits and environmental conditions. Challenges such as nutrient deficiencies, sunburn, and diseases like bacterial soft rot, gray mold, and powdery mildew underscore the need for tailored

strategies. Practices including seed selection, soil treatment, and ecological adjustments like improved ventilation and temperature control are crucial. Implementing these measures not only mitigates disease risks but also enhances plant resilience and overall productivity. Continuous research and funding support, as exemplified by projects like HX20240037 and 2023YFZD014, are essential for advancing green technologies in flower cultivation, ensuring sustainable and resilient practices in floral facilities.

15. References

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